National Institute of Environmental Health Sciences

Microbiological surveillance of private water supplies in England: The impact of environmental and climate factors on water quality

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Year: 2009
Journal: Water Research. 43 (8): 2159-2168

Abstract:

A passive surveillance system captured information on 34,904 microbiological samples from 11,233 private drinking water supplies within England as well as the associated constructional, climatic and environmental variables. Escherichia coli was detected in 6588 (18.87%) of samples and at least one positive sample was detected from 3638 (32.39%) of sites. However, this estimate of supplies failing to meet the European drinking water E. coli standard was probably an underestimate as the more samples taken per supply, the more likely the supply was to fail. A multivariable model of private water supplies data showed a strong seasonal impact, with samples between January and May being significantly less contaminated with E. coli than samples between June and December. Samples from springs (OR 2.5, CI 2.0-3.1) or surface waters (OR 2.4, CI 0.8-7.0) were more likely to fail than groundwater sources, as were supplies with no effective treatment (OR1.8, CI 1.5-2.3). Commercial supplies were less likely to fail than domestic supplies (OR 0.63, CI 0.48-0.83) and the probability of failure was linearly associated with the density of sheep in the area and rainfall on the previous day. A Monte Carlo modelling approach was used to estimate that, had sufficient samples been taken, 54% (95% confidence intervals 49-59%) of all private water supplies in England were likely to be unsatisfactory. These findings will be able to inform risk assessments of private water supplies prior to microbiological results being available.

Source: http://dx.doi.org/10.1016/j.watres.2009.02.035

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Quality

Food/Water Quality: Pathogen

Geographic Feature:

resource focuses on specific type of geography

Freshwater

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : England

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Foodborne/Waterborne Disease

Foodborne/Waterborne Disease (other): Escherichia coli

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content